

REMARKS

In the Office Action mailed October 29, 2002, claims 9-19, 26, 28, 32, 35 and 39-49 were withdrawn from consideration. Claims 1-8, 20-25, 27, 29-31, 33-34, 36-38 and 50-51 were rejected under 35 U.S.C. 112, first paragraph. The elected compound was allowed.

Amendments

Claims 1 and 23 have been amended to include the limitation R and R' include alkyl groups having from one to twenty carbon atoms. This amendment is supported by the specification on page 17, lines 16-17. No new matter is added.

Election of Species

In the Office Action mailed October 29, 2002, claims 9-19, 26, 28, 32, 35 and 39-49 were withdrawn from consideration as being drawn to a nonelected invention. In response, it is believed claims 9-19 and 35 are drawn to the elected invention and should be rejoined. Claims 9-19 are all directly or indirectly dependent on claim 1 and claim the LC composition of claim 1 further comprising one or more additional compounds. In addition, claim 35 is believed drawn to the elected invention. Claim 35 is a liquid crystal compound where the core is an optionally substituted phenylpyrimidine. The elected species has this core. Reconsideration and rejoinder is respectfully requested.

35 U.S.C. 112, first paragraph rejection

In the Office Action mailed October 29, 2002, claims 1-8, 20-25, 27, 29-31, 33-34, 36-38 and 50-51 were rejected under 35 U.S.C. 112, first paragraph "because the specification, while being enabling for core rings A, B and C in Scheme 1 (pages 30-35), does not reasonably provide enablement for other than the teaching in Scheme 1."

In response, it is believed claims 1-8, 20-25, 27, 29-31, 33-34, 36-38 and 50-51, as well as all other claims are enabled. The only claims that do not contain a core or other structure that is directly shown in Scheme 1 are claims 1, 4-8, 20-23, 50 and 51. Therefore, it is believed the rejection should only apply to those claims. With respect to

claims 50 and 51, these claims are device claims containing the LC composition of claim 1. The construction and use of LC devices is well known to one of ordinary skill in the art. The specification on page 9, first paragraph, describes construction and use of LC and FLC cells and devices. Also, the patents listed on page 22, incorporated by reference on page 29, lines 5-6, describe production of LC cells and devices. Claims 4-6 and 20-22 are discussed further below.

Claims 2, 3, 24, 25, 27, 29-31, 33, 34, and 36-38 clearly claim cores and other structures included in Scheme 1 (said to be enabled). Claims 2 and 24 claim a compound having a “core selected from the cores listed in Scheme 1.” Claims 3 and 25 claim a phenyl pyrimidine core. Phenyl pyrimidine cores are shown in Scheme 1 on page 30. Claims 27 and 38 limit the variable X1 to oxygen. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation. Claim 29 limits the double bond in the alkene tail to a cis double bond. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation. Claim 30 limits the double bond in the alkene tail to a trans double bond. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation. Claim 31 limits the core to containing two aromatic rings. Two aromatic rings are shown for the core in Scheme 1, page 30. Claims 33 and 36 limit $m + n$ from 5 to 12. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation. Claim 34 limits n to 3 and m to 4. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation. Claim 37 limits $m + n$ from 8 to 12. Numerous compounds are shown in the Schemes and Tables of the specification with this limitation.

The Office Action stated: “there are no teachings how one of the ordinary skill in the art can synthesize the compound represented by formula (I) except the compounds in Scheme 1 exemplified in the specification.” The compounds of formula (I) include these where the core is “aromatic or alicyclic, if aromatic one or two ring carbons can be replaced with a heteroatom or if alicyclic rings can contain 3-10 carbon atoms and optionally can contain a double bond, wherein one or two CH_2 of the alicyclic ring can be replaced with O or a C=O group” (claim 1). Contrary to the statement in the Office

Action, all compounds claimed can be readily made and used by one of ordinary skill in the art without undue experimentation. For example, there are numerous patents listed in the specification on page 22 that describe synthetic methods of making the compounds of the invention. In particular, U.S. Patent 5,380,460 describes making and using rings with sulfur heteroatoms. U.S. Patent 5,271,864 shows the preparation and use of alicyclic structures. U. S. Patents 5,453,218 and 5,585,036 show the preparation and use of both aromatic and alicyclic rings. Also, the specification on pages 23-28 describes preparation of a variety of structures, including perfluoroalkyl and alkenyl tail groups. In addition, the attached Declaration of Michael Wand states all core structures and tails, as well as all compounds claimed in the application can be prepared without undue experimentation. In addition to the compounds shown in scheme 1, there are many other compounds exemplified in the specification. For example, there are numerous compounds exemplified in Schemes 2-3 (pages 36-41) that further exemplify the invention.

As indicated by Michael Wand in the attached Declaration, the chemistry involved in making the compounds of the invention is straight-forward and can be easily carried out by one with ordinary skill in the art without undue experimentation.

OK The Office Action continues: “also, the R and R’ groups do not have limitation on carbon atoms in alkyl.” In response to this portion of the rejection, independent claims 1 and 23 have been amended to include the limitation the alkyl groups having from one to twenty carbon atoms. This amendment is supported by the specification on page 17, lines 16-17.

The Office Action states “without knowledge of the properties of species commensurate in scope with the claims, Applicants invite the skilled artisan to first synthesize and then test the species before a use can be undue. The properties of LC vary greatly with the number and type of rings, bonding, lateral and terminal substituents and polarities. All govern the properties of the LC and mixture thereof, which further determine the utility in one of a multitude of functionally distinct compositions and

experiment or even presupposing the species call [sic] can be readily made.” Only claims 4-6 and 20-22 describe properties of the LC compounds and compositions. Therefore, this portion of the rejection is believed directed only to those claims. Contrary to the statement in the Office Action, the testing of a species to determine if the compound falls within the claimed properties is not undue. The properties claimed in claims 4-6 and 20-22 can be determined by the preparation of a simple phase diagram that anyone with ordinary skill in the liquid crystal art would be able to prepare without undue experimentation. This statement is supported by the attached Declaration of Michael Wand. It is not undue experimentation to synthesize and test a species. The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. In re Angstadt, 537 F.2d 498, 504, 190 USPQ 214, 219 (CCAPA 1976), cited in MPEP 2164.01. If the testing is routine, the testing is not undue (In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988)). As stated by Michael Wand in the attached Declaration, the determination of the phases that a liquid crystal composition contains, as well as the temperature ranges and the physical properties of the composition is well within the skill level of one of ordinary skill in the art and is carried out without under experimentation.

CONCLUSION

In view of the above arguments and amendments, it is believed claims 1-25, 27, 29-31, 33-38 and 50-51 are allowable. Reconsideration and withdrawal of the rejections is respectfully requested.

With this amendment, this application is believed to be in order for allowance and passage to issuance is respectfully requested. It is believed that a fee in the amount of \$930.00 for a three-month extension of time is due with the submission of this

Amendment. This fee, as well as a petition requesting this extension of time, is included with this response. If the fee enclosed is incorrect, however, please charge any additional fee, or credit any overpayment to Deposit Account No. 07-1969.

Respectfully submitted,

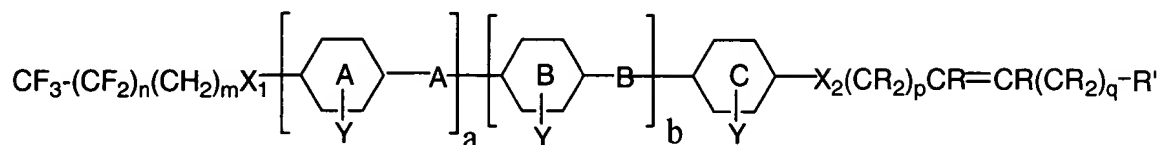


Susan K. Doughty
Reg. No. 43,595

GREENLEE, WINNER AND SULLIVAN, P.C.
5370 Manhattan Circle, Suite 201
Boulder, CO 80303
Telephone: (303) 499-8080
Facsimile: (303) 499-8089
E-mail: winner@greenwin.com

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1. (Once amended) A liquid crystal composition comprising one or more compounds of the formula:



Formula I

wherein:

a and b are 0 or 1;

A and B, independently, are selected from the group consisting of a single bond, -COO-, -OOC-, -CH₂-CH₂-, -OCH₂-, -CH₂-O-, -CH=CH- (cis or trans); -C≡C-, -CH=CH-CH=CH- (cis or trans);

Y represents up to four substituents on a given ring where the substituents are selected from a halogen, CN or NO₂;

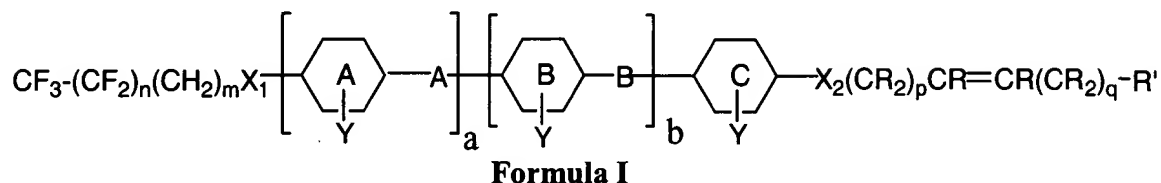
Core rings A, B and C can be aromatic or alicyclic, if aromatic one or two ring carbons can be replaced with a heteroatom or if alicyclic rings can contain 3-10 carbon atoms and optionally can contain a double bond, wherein one or two CH₂ of the alicyclic ring can be replaced with O or a C=O group;

m and n are integers ranging from 1 to 20, inclusive; p is an integer ranging from 2 to 20, inclusive; q is 0 or an integer ranging from 1 to 20; inclusive; n + m is 4 to 20 and p + q is 4 to 20;

X₁ and X₂, independently, are -O- or a single bond; and

R and R', independent of other R or R' in the alkenyl tail are hydrogens or alkyl groups having from one to twenty carbon atoms.

23. (Once amended) A LC compound having the formula:



wherein:

a and b are 0 or 1;

A and B, independently, are selected from the group consisting of a single bond, -COO-, -OOC-, -CH₂-CH₂-, -OCH₂-, -CH₂-O-, -CH=CH- (cis or trans); -C≡C-, -CH=CH-CH=CH- (cis or trans);

Y represents up to four substituents on a given ring where the substituents are selected from a halogen, CN or NO₂;

Core rings A, B and C can be aromatic or alicyclic, if aromatic one or two ring carbons can be replaced with a heteroatom or if alicyclic rings can contain 3-10 carbon atoms and optionally can contain a double bond, wherein one or two CH₂ of the alicyclic ring can be replaced with O or a C=O group;

m and n are integers ranging from 1 to 20, inclusive; p is an integer ranging from 2 to 20, inclusive; q is 0 or an integer ranging from 1 to 20; inclusive; n + m is 4 to 20 and p + q is 4 to 20;

X₁ and X₂, independently, are -O- or a single bond; and

R and R', independent of other R or R' in the alkenyl tail are hydrogens or alkyl groups having from one to twenty carbon atoms.